REMARKS

In accordance with the foregoing, the pending claims 1-72 remain for reconsideration, which is respectfully requested.

No new matter has been added.

The Examiner's rejections are respectfully traversed.

STATUS OF THE CLAIMS

Claims 1-72 are pending.

Claims 1-72 are rejected.

ITEM 3: SUMMARY OF THE INVENTION:

The Examiner, at item 3, second paragraph, asserts "the first embodiment does not need to calculate the number of sustain emissions in each subframe and a number of sustain emissions is previously set in the memory for each subframe." Applicants respectfully disagree with the Examiner's assertion, because the Specification at column 13, lines 27-38 recites:

> First, the brightness B of a panel is measured for some numbers P of sustain discharge pulses to get actually measured values in a gray scale-brightness characteristic as shown in FIG. 7, and the resultant curve is made B=f1(P) of the equation (1). In the prior art, the number of sustain emissions in each subframe is so set that the number of pulses in an arbitrary subframe is two times the number of pulses in the subframe next brighter than the former. However, **in this embodiment, the number of sustain emissions in each subframe is so set that the brightness of an arbitrary subframe is two times the brightness of the subframe next brighter than the former**.
>
> (emphasis added)

The Specification, at column 12, line 60, to column 13, line 18, further recites:

> In FIG. 8, a dashed line indicates the relation before the optimization, a fine solid line indicates the relation after the optimization, and a thick solid line indicates an ideal line. The embodiment shown in FIG. 8 has an advantage that it **does not need complex calculations**, but lacks linearity in higher gray levels when the linearity of the brightness B of the panel with respect to the number P of sustain discharge pulses is low. **Namely, the numbers of sustain emissions of each subframe are like a geometric series (1, 2, 4, 8, . . .) in the conventional gray scale controlling method**, whereas the numbers of sustain

> emissions of each subframe is set on the basis of the brightness of the each subframe in the inventive gray scale controlling method for the plasma display device. Therefore, the numbers of sustain emissions of each subframe are not like a geometric series in the inventive gray scale controlling method for a plasma display device. Namely, **the number of sustain emissions in each subframe is set in an anti-geometrical progression, or the number of sustain emissions in each subframe is not determined in accordance with any mathematical relationship**.
>
> (emphasis added)

Applicants respectfully disagree with the Examiner's assertion that "the first embodiment does not need to calculate the number of sustain emissions in each subframe," because the specification clearly states that "The embodiment shown in FIG. 8 has an advantage that it **does not need complex calculations**," which clearly infers that calculations are occurring, even though the calculations are "not complex." The Examiner appears to be confused by the recitation "the number of sustain emissions in each subframe is set in an anti-geometrical progression, or the number of sustain emissions in each subframe is not determined in accordance with any mathematical relationship."

As recited in Wikipedia:

> In mathematics, a **geometric progression**, also known as a **geometric sequence**, is a sequence of numbers where each term after the first is found by multiplying the previous one by a fixed non-zero number called the *common ratio*. For example, the sequence 2, 6, 18, 54, ... is a geometric progression with common ratio 3 and 10, 5, 2.5, 1.25, ... is a geometric sequence with common ratio 1/2. The sum of the terms of a geometric progression is known as a geometric series.
>
> (see, http://en.wikipedia.org/wiki/Geometric_progression, last viewed April 12, 2007)

In other words, a geometric progression is a sequence of numbers with a common ratio between them. For example, the series (1, 2, 4, 8, 16...) would have a common ratio of 2, that is, 1x2 = 2, 2x2 = 4, 4x2 = 8, 8x2 = 16.... Accordingly, the recited "anti-geometrical progression" would not have a common ratio between the numbers. As seen in the example in Table 1 of column 12 of the application specification, the number of sustain discharge pulses for grey levels 0-7 respectively are (0, 15, 30, 45, 80, 85, 110, 125). This is an anti-geometric progression because there is no common ratio between the sustain discharge pulses, that is, 15x2 = 30, 30x1.5 = 45, 45x1.7778 = 80.... Therefore, because there is no common ratio or, in other words, because there is no mathematical relationship between the number of sustain discharge pulses, the first embodiment uses an anti-geometric progression.

As recited in the application specification, at column 12, lines 35-38: "in this embodiment, the number of sustain emissions in each subframe is so set that the brightness of an arbitrary subframe is two times the brightness of the subframe next brighter than the former." In other words, the number of sustain emissions of each subframe are calculated based upon the brightness of an arbitrary subframe being set to be twice the brightness of the subframe previous to the arbitrary subframe. Accordingly, applicants respectfully submit that the first embodiment does need to calculate the number of sustain emissions for each subframe.

ITEM 4: REJECTION OF CLAIMS 1-72 UNDER 35 U.S.C. § 251:

The Office Action, at item 4, lines 9-16, asserts:

> Independent claim 1 further recites a feature, 'a ratio of numbers of sustain emissions of said plurality of subframes does not equal the ratio of the specific weight values of said plurality of subframes' presently recited in lines 10-12, which is **only readable on the first embodiment** and **not readable in the second and third embodiments** since the second or third embodiment does not teach a ratio relationship between a ratio of number of sustain emissions of said plurality of subframes and a ratio of the weight values of said plurality of subframes or a ratio of numbers of sustain emissions of said plurality of subframes not being equal the ratio of the weight values of said plurality of subframes.

Applicants respectfully disagree with the assertion because, as shown by the fine solid line in figure 7 of this application, in plasma display devices (PDPs), ideally, the brightness should have a linear relationship to the number of discharges. However, as shown by the dashed line of figure 7, in actual PDPs, the relationship of the brightness with respect to the number of sustain discharges is not linear, but curved.

As seen in the dashes lines of figures 8-10, in the prior art, the number of sustain emissions in each subframe is set so that the number of pulses in an arbitrary subframe is two times the number of pulses in the next brighter subframe. In contrast, as shown by the fine solid line (Optimization No. 1) of figure 8, in an embodiment of the present invention, the number of sustain emissions in each subframe is set so that the brightness of an arbitrary subframe is two times the brightness of the next brighter subframe.

For example, as seen in figures 9 and 10, in another embodiment, the difference between a calculated brightness and a target brightness in a certain gray level in a certain sustain pulse number ratio is assumed, and the numbers of sustain pulses of each subframe can be determined.

Claim 1, for example, recites, in part, "calculating numbers of sustain emissions of said plurality of subframes so as to make a ratio of brightnesses of said plurality of subframes substantially correspond with a ratio of the specific weight values of said plurality of subframes, wherein a ratio of numbers of sustain emissions of said plurality of subframes does not equal the ratio of the specific weight values of said plurality of subframes."

As seen in figure 7, in the prior art, the ratio of the brightness of a plasma display panel is not equal to a ratio of a number of sustain discharge pulses. In other words, there is not a one to one ratio between the number of discharge pulses and the brightness of the plasma display panel, as can be seen by the curved dashed line entitled "actual measured value." The prior art attempts to overcome this problem by, as recited in the Specification at column 12, lines 31-34, "the number of sustain emissions in each subframe is so set that the number of pulses in an arbitrary subframe is two times the number of pulses in the subframe next brighter than the former." In other words, the prior art sets an arbitrary subframe to have twice the number of sustain pulses as the previous subframe. However, because of the non-linear relationship between the brightness of the screen and the number of sustain discharge pulses, as seen in Figure 7, even if the number of sustain emissions of an arbitrary subframe is set to be twice as high as the previous subframe, the arbitrary subframe may not be twice as bright as the previous subframe because of the non-linear relationship between the brightness of the screen and the number of sustain discharge pulses.

Figure 9 shows an example of the second embodiment of the present invention. As seen in figure 9, the second embodiment overcomes the deficiencies in the prior art by calculating the number of sustain emissions in each subframe such that there is an optimized relationship between the actual brightness of each subframe and the targeted brightness -- that is, the desired weight of each grey level. For example, assuming a frame has 3 subframes, each of which is weighted to be twice as bright as the previous subframe, (i.e., a weight ratio of 1:2:4), the claimed embodiment calculates the number of sustain emissions for each subframe to achieve the optimized brightness and weight ratios. As seen in Figure 7, as the number of sustain emissions increases, the effect of the increased number of sustain emissions does not linearly affect the brightness of the screen. Therefore, in order to achieve the desired weight ratio in the present embodiment, the ratio of the number of sustain emissions will differ from the weight ratio. For example, using the measurements from Figure 7, a desired weight ratio for the three subframes of 1:2:4 with a corresponding brightness of 15:30:60 (cd/m^2) (which, when normalized by dividing by a common denominator of 15, would have a brightness ratio of 1:2:4), would have a corresponding ratio of the number of sustain emissions of approximately 15:30:80

(which, if also divided by 15, would have a corresponding ratio of 1:2:5.333). In other words, the number of sustain emissions of the plurality of subframes are calculated so as to make a ratio of brightnesses of the subframes substantially correspond with a ratio of the specific weight values of the subframes, wherein a ratio of numbers of sustain emissions of said plurality of subframes does not equal the ratio of the specific weight values of said plurality of subframes. Thus, as seen in the solid line (Optimization No. 2) in figure 9, in order to have a ratio of brightnesses of a plurality of subframes to substantially correspond with a ratio of the specific weight values of said plurality of subframes, the number of sustain emissions in the frames must be calculated such that a ratio of numbers of sustain emissions of said plurality of subframes would not equal the ratio of the specific weight values of said plurality of subframes.

Accordingly, Applicants respectfully submit that claim 1 is supported by the specification and that no new matter has been added in the reissue application.

Furthermore, the Office Action, at page 5, lines 7-10 asserts, regarding claim 18: "the second/third embodiment only teaches numbers of sustain emissions of the **plurality of subframes** (but not a number of emissions of **each grey level**, as claimed) calculated...." Applicants respectfully disagree because, for example, the Specification, at column 11, lines 39 to 48, recites:

> Note that, in each of the following embodiments, the gray level 0 corresponds to the case when no sustain emission is done in any subframe (or subfield) SF1 through SF3, the gray level 1, 2 and 4 correspond to the case when sustain emissions of only one subframe SF1, SF2, or SF3 are done, the gray level 3, 5 and 6 correspond to the case when sustain emissions of two subframes SF1 and SF2, SF1 and SF3, or SF2 and SF3 are done, and the gray level 7 corresponds to the case when sustain emissions of all the subframes SF1 through SF3 are done.

Accordingly, Applicants respectfully submit that the Specification supports the claimed "displaying the image on said plasma display device by optionally combining gray levels of said plurality of subframes, wherein numbers of sustain emissions of each gray level are calculated so as to make a ratio of brightnesses of each gray level substantially correspond with a ratio of specific weight values of each gray level and ratio of numbers of sustain emissions of each gray level does not equal the ratio of the specific weight values of each gray level," as recited, for example, in claim 18, because the claimed "subframes" correspond to the claimed "gray levels" as discussed above. Accordingly, Applicants respectfully submit that claim 18 is supported in the Specification and that no new matter has been added in the reissue application.

The Office Action, at page 5, line 20 to page 6, line 5, asserts that "the patent does not teach a display device and a method including" the claimed "setting a number of sustain emissions, individually for and corresponding to the predetermined brightness of each individual subframe, different subframes bearing a non-linear relationship to the different, predetermined brightnesses of the respective, different subframes," as recited, for example, in claim 28. Applicants respectfully disagree with the Examiner's assertion, because, as discussed above, and as seen in the dashed line Figure 9, the relationship between a given brightness and a number of sustain discharge pulses is non-linear. Accordingly, the claimed embodiment calculates "individually for and corresponding to the predetermined brightness of each individual subframe," "a number of sustain emissions... bearing a non-linear relationship to the different, predetermined brightnesses of the respective, different subframes," in order to achieve the optimized brightness, demonstrated, for example, by the solid line in Figure 9, for each subframe. Accordingly, Applicants respectfully submit that claim 28 is supported in the Specification and that no new matter has been added in the Reissue Application.

Independent claims 37, 46, 48, 63, and 72 are supported by the prior patent for similar reasons as independent claims 1, 18 and/or 27.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 251 rejection.

ITEMS 5-6: REJECTION OF CLAIMS 1-72 UNDER 35 U.S.C. § 112, FIRST PARAGRAPH:

Claims 1-72 are rejected for under 35 U.S.C. §112, first paragraph, for similar reasons as the rejection of claims 1-72 under 35 U.S.C. § 251. Applicants respectfully submit that the claims contain subject matter which was described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time of the application was filed, had possession of the claimed invention, for similar reasons as discussed above. Withdrawal of the 35 U.S.C. § 112, first paragraph, rejection is respectfully requested.

ITEMS 7-8: REJECTION OF CLAIMS 1-11, 18, 27, 46-56, 63 AND 72 UNDER 35 U.S.C. § 102(a) AS BEING ANTICIPATED BY APPLICANTS' ALLEGEDLY ADMITTED PRIOR ART, HEREINAFTER "AAPA."

The Office Action, at item 8, asserts that the claimed "calculating numbers of sustain emissions of said plurality of subframes so as to make a ratio of brightnesses of said plurality of subframes substantially correspond with a ratio of the specific weight values of said plurality of subframes," as recited in claim 1, is anticipated by figure 7. Applicants respectfully disagree, because, as seen in figure 7 of this application, in plasma display devices (PDPs), ideally, the brightness should have a linear relationship to the number of discharges. However, as shown

by the dashed line of figure 7, in actual PDPs, the relationship of the brightness with respect to the number of sustain discharges is not linear, but curved. Accordingly, Applicants respectfully submit that the ratio of brightnesses of said plurality of subframes **does not substantially correspond** with a ratio of the specific weight values of said plurality of subframes in figure 7.

Furthermore, the Office Action, at item 8, asserts, that the claimed "ratio of numbers of sustain emissions of said plurality of subframes does not equal the ratio of the specific weight values of said plurality of subframes," as recited in claim 1, is anticipated by the alleged AAPA, however, the Office Action fails to cite any part of the alleged AAPA to support the assertion. The Office Action further asserts:

> wherein a ratio of numbers of sustain emissions of subframes in the order **SF4:SF2:SF3:SF1** is **80:20:40:10** and a ratio of the specific weight values of said plurality of subframes in the order of **SF1:SF2:SF3:SF4** is **1:2:4:8**, i.e., the ratio of the numbers of sustain emissions of subframes does not equal to the ratio of the specific weight values of said plurality of subframes...

It is unclear why the Office Action reordered the "ratio of numbers of sustain emissions of subframes" to "SF4:SF2:SF3:SF1," however, if the subframes were placed in numerical order, i.e. SF1:SF2:SF3:SF4, the "ratio of numbers of sustain emissions of subframes" would be 10:20:40:80, which Applicants respectfully submit is equal to the "ratio of the specific weight values of said plurality of subframes" asserted by the Office Action, i.e. a ratio of 1:2:4:8 is equivalent to the ratio 10:20:40:80.

Applicants respectfully submit that independent claims 3, 18, 27, 46, 48, 63 and 72 patentably distinguish over the alleged AAPA for similar reasons as independent claim 1.

Dependent claims are patentably distinguishing at least due to their dependence from the independent claims and/or for reciting patentably distinguishing features of their own. Withdrawal of the rejection of the pending claims and allowance of the pending claims is respectfully requested.

ITEM 9: REJECTION OF CLAIMS 1, 3-13, 18, 27, 46, 48-58, 63 AND 72 UNDER 35 U.S.C. § 102(a) AS BEING ANTICIPATED BY SHINODA, U.S. PATENT NO. 5,541,618, HEREINAFTER "SHINODA."

Shinoda discloses that a frame displaying a single picture is divided into a plurality of sequential subframes, and each of the subframes has an addressing period (data writing step) and a display period (data displaying step) subsequent to the address period. In Shinoda, the

number of sustain pulses included in each display period is predetermined differently for each subframe according to a weight given to each subframe,

Further, Shinoda, at column 4, line 64 to column 5, line 39 discusses calculating a number of sustain pulses included in each subframe. Specifically, a total time length occupied by address periods of 8 subframes is calculated by 621 x 8=4,968 μs, a time length allocated to a minimum unit of 256 grades (represented by 8 bits) is calculated to be 45.67 μs. Further, the total number of sustain pulse pairs in a second is calculated based on 14 μs of a sustain period, and the number of sustain pulses of an nth subframe is set to approximately two times the number of sustain pulses of an (n-1)th subframe. That is, Shinoda defines the following:

Display Period	Number of sustain pulses
1st SF	3
2nd SF	6
3rd SF	13
4th SF	26
5th SF	52
6th SF	104
7th SF	209
8th SF	418

Thus, in Shinoda, the number of sustain pulses in an nth frame is approximately two times the number of subframes in the (n-1)th frame. That is, subframe 8 has approximately two times the number of pulses as subframe 7, subframe 7 has approximately two times the number of pulses as subframe 6..., etc. Therefore, in Shinoda, the relationship of the brightness with respect to the number of sustain discharges (the number of sustain pulses) is considered linear, and, thus, is similar to the prior art as seen in figure 7 of the present application. In other words, as discussed above, the relationship between the brightness of a screen and a number of sustain pulses is non-linear. Thus, although a subframe may have approximately twice the number of sustain pulses as a previous subframe, the subframe will not necessarily be twice as bright as the previous subframe, see, for example, Figure 7 of the present application.

Accordingly, Applicants respectfully submit that an anticipation rejection cannot be based upon Shinoda, because Shinoda fails to disclose, either expressly or inherently, the claimed "," as recited, for example, in claim 1, because Shinoda discloses linearly increasing a number of sustain pulses as a subframe weight increases.

Applicants respectfully submit that independent claims 3, 18, 27, 46, 48, 63 and 72 patentably distinguish over the cited reference for similar reasons as independent claim 1.

Dependent claims are patentably distinguishing at least due to their dependence from the independent claims and/or for reciting patentably distinguishing features of their own. Withdrawal of the rejection of the pending claims and allowance of the pending claims is respectfully requested.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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